IN THE CLAIMS

1. (currently amended) A process for enhancing the sorption capacity of a groundwater-bearing formation comprising the steps of:

a. providing a groundwater-bearing formation comprising groundwater and a mineral compound, wherein said mineral compound has a mineral surface comprising sorbing sites having an initial metal contaminant sorption capacity and said mineral compound comprises one or more of ferric oxide, manganese oxide, alumina, silica or their respective hydrous, anhydrous hydroxy, or oxyhydroxy forms, wherein said groundwater may contain mobile metal contaminants;

b. applying an aqueous alkaline solution to the groundwater-bearing formation, wherein said application of said aqueous alkaline solution inhibits desorption of metals from the mineral surface to form a new mobile metal contaminant; and

c. contacting said mineral compound with said aqueous alkaline solution to convert the mineral compound to a form having a higher metal contaminant sorption capacity than the initial metal contaminant sorption capacity thereby forming a treated mineral compound within said groundwater-bearing formation.

2. (original) The process according to claim 1 wherein the application step is accomplished through injection

of the aqueous alkaline solution into the groundwater-bearing formation.

3. (currently amended) The process according to claim 1 wherein said aqueous alkaline solution comprises one or more of NaOH, Na_2CO_3, or Na_2SiO_3~~, or a combination thereof~~.

4. - 5. (cancelled)

6. (original) The process according to claim 1, wherein said groundwater may further contain dissolved metal species, said process comprising a further step of:

d. contacting the groundwater with the aqueous alkaline solution to precipitate the dissolved metal species to form precipitated metal species, wherein the precipitated metal species provides additional metal ion contaminant sorbing sites.

7. (previously presented) The process according to claim 6 wherein said dissolved metal species is selected from the group consisting of iron (III), iron (II), manganese (III), manganese (II), aluminum (III) and silicon (IV).

8. (previously presented) A process for the remediation of groundwater contaminated by metal ions through attenuation of the metal content therein, wherein said groundwater is in a groundwater-bearing formation, comprising the steps of:

a. providing a groundwater-bearing formation, wherein said groundwater-bearing formation comprises groundwater and a mineral compound, and wherein said mineral compound has a mineral surface comprising sorbing sites having an initial metal contaminant sorption capacity, and wherein said groundwater may contain mobile metal contaminants;

b. applying an aqueous alkaline solution to the groundwater-bearing formation in a manner that permeates the zones of the aquifer through which water flows;

c. contacting said mineral compound with said aqueous alkaline solution to convert the mineral compound to a form having a higher metal contaminant sorption capacity than the initial metal contaminant sorption capacity to form a treated mineral compound within said groundwater-bearing formation; and

d. contacting said treated mineral compound with groundwater that may contain mobile metal contaminants to permit the treated mineral compound to sorb mobile metal contaminants to form groundwater having an attenuated metal content.

9. (original) The process according to claim 8 wherein the application step is accomplished through injection of the aqueous alkaline solution into the groundwater-bearing formation.

10. (previously presented) The process according to claim 8 wherein said aqueous alkaline solution comprises one or more of NaOH, Na_2CO_3, or Na_2SiO_3.

11. (original) The process according to claim 8 wherein said mineral compound comprises one or more of ferric oxide, manganese oxide, alumina, silica or their respective hydrous, anhydrous hydroxy, or oxyhydroxy forms.

12. (original) A process for the protection of well-head from metal contaminants, wherein said well-head is in a groundwater-bearing formation, comprising the steps of:

a. providing a well-head in a groundwater-bearing formation, wherein said groundwater-bearing formation comprises groundwater and a mineral compound, and wherein said mineral compound has a mineral surface comprising sorbing sites having an initial metal contaminant sorption capacity, and wherein said groundwater may contain mobile metal contaminants;

b. applying an aqueous alkaline solution to the groundwater-bearing formation in a manner such that at least some of the groundwater reaching the well-head has had to pass through the portion of the groundwater-bearing formation that has the treated mineral compound formed in step *c*;

c. contacting said mineral compound with said aqueous alkaline solution to convert the mineral compound to a form having a higher metal contaminant sorption capacity than the initial metal contaminant sorption capacity to form a treated mineral compound within said groundwater-bearing formation;

d. contacting said treated mineral compound with groundwater that may contain mobile metal contaminants to permit the treated mineral compound to sorb mobile metal contaminants to form groundwater having an attenuated metal content thereby protecting the well-head from metal contaminants.

13. (original) The process according to claim 12 wherein the application step is accomplished through injection of the aqueous alkaline solution into the groundwater-bearing formation.

14. (previously presented) The process according to claim 12 wherein said aqueous alkaline solution comprises one or more of NaOH, Na_2CO_3, or Na_2SiO_3.

15. (original) The process according to claim 12 wherein said mineral compound comprises one or more of ferric oxide, manganese oxide, alumina, silica or their respective hydrous, anhydrous hydroxy, or oxyhydroxy forms.

16. (original) A process for providing a backstop to a permeable reactive barrier water treatment method or a water source control method to further remove metal contaminants, wherein groundwater in a groundwater-bearing formation has been previously treated by a permeable reactive barrier water treatment method or a water source control method, said backstop comprising the steps of:

a. providing a groundwater-bearing formation, wherein said groundwater-bearing formation comprises a mineral compound and groundwater that has been previously treated by a permeable reactive barrier water treatment method or a water source control method, and wherein said mineral compound has a mineral surface comprising sorbing sites having an initial metal contaminant sorption capacity, and wherein said groundwater may contain mobile metal contaminants;

b. applying an aqueous alkaline solution to the groundwater-bearing formation in a manner that at least some of the groundwater reaching the portion of the groundwater-bearing formation that has the treated mineral compound formed in step *c* has been previously treated by a permeable reactive barrier water treatment method or a water source control method;

c. contacting said mineral compound with said aqueous alkaline solution to convert the mineral compound to a form having a higher metal contaminant sorption capacity than the initial metal contaminant sorption capacity to form a treated mineral compound within said groundwater-bearing formation;

d. contacting said treated mineral compound with groundwater that may contain mobile metal contaminants to permit the treated mineral compound to sorb mobile metal contaminants to form groundwater having an attenuated metal content thereby providing a backstop to a permeable reactive barrier water treatment method or a water source control method to further remove metal contaminants.

17. (original) The process according to claim 16 wherein the application step is accomplished through injection of the aqueous alkaline solution into the groundwater-bearing formation.

18. (previously presented) The process according to claim 16 wherein said aqueous alkaline solution comprises one or more of NaOH, Na_2CO_3, or Na_2SiO_3.

19. (original) The process according to claim 16 wherein said mineral compound comprises one or more of ferric oxide, manganese oxide, alumina, silica or their respective hydrous, anhydrous hydroxy, or oxyhydroxy forms.

20. (previously presented) The process according to claim 1 wherein said aqueous alkaline solution has a pH of 8 or greater.

21. (previously presented) The process according to claim 8 wherein said aqueous alkaline solution has a pH of 8 or greater.

22. (previously presented) The process according to claim 12 wherein said aqueous alkaline solution has a pH of 8 or greater.

23. (previously presented) The process according to claim 16 wherein said aqueous alkaline solution has a pH of 8 or greater.